

Development of Personas for Designing for Individuals with Mobility Impairments

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Rehabilitation Engineering Research Center on Technologies to Support Successful Aging with Disability (RERC TechSAge)

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1. Introduction

When designing products, many designers come across stumbling blocks. Designs that seem appropriate in production may end up being failures in the hands of consumers. Naturally, companies have questioned why. Research points to a failure to be user-centered; in other words, there is a breakdown between what consumers want and what designers think consumers want. By relying on research into various findings and techniques, companies can better tailor products to their customers, increasing sales, customer satisfaction, and efficiency within the organization. Particular applications to the field of disability technology may become increasingly useful in the future.

According to Pruitt and Adlin (2006, p. 6), there are three main issues which prevent designers from being more user centered. The first is the natural inclination towards self-centeredness. Designers often consider what features, details, and aspects they would enjoy, but neglect what the actual users need, want, prioritize, and have the ability to do. Thinking like a designer can become a detriment—because a designer knows the product inside and out, they may forget that others do not. Without behind-the-scenes knowledge of a product, or knowledge of technology in general, products that designers think are simple can be very difficult for users to understand. This disconnect can create frustration in users, who may find aspects of the design overly complex, useless, or irritating. The second issue in the way of being user-centered is the users themselves. A user base is complicated. No two customers are exactly alike, and at times their needs and wants conflict. This conundrum can confuse designers and cause projects to become unfocused. The last issue is that those who do research on users are typically not the ones who design or build the product. While these divisions communicate, hearsay is not as

strong as hands-on knowledge. Designers may not have a clear picture of the consumer base.

Due to these issues, a systematic method of keeping users in mind is needed when designing products. User-centered design attempts to address these concerns. One technique within this field is the creation of personas, fictional people created to consolidate a firm idea of a user. This technique is used to create a common ground within the company from which to open communication, as well as focus projects.

Research shows that personas increase designers' empathy for their users (Grudin, 2006). Being able to imagine what a real person using the product would be like can help employees think less self-centeredly and create in a user-centered fashion. In that case, one could assume designing with a real customer as a model might be beneficial. However, designing for a persona is actually more accurate. A real person is not as generalizable as a persona, which is built from data to be as representative of an average user as possible (Pruitt & Adlin, 2006, p. 108). Regardless, having a single idea of a user to design for streamlines the process, limiting the number of choices the designer can make. Trying to design with only a vague idea of the user base, or to design a product that will make "everyone" happy, tends to bring about unfocused work. Designing for a persona creates a product optimized for a large portion of the users. As Pruitt and Adlin point out, no matter what, not everyone will love a product. Having a product be optimized to the most important consumers, while creating a useful product for most others, is the best course of action (2006, p. 109). Additionally, personas are useful within the company. Having a singular entity to design for puts all the designers on the same page, with the same idea of the user, and allows for easier communication from the research team to other branches of the company.

Specifically, we were interested in aiding the design of technology and aids for

individuals aging with disabilities. Research suggests that these individuals may be most successful in aging in place if interventions are targeted to them and implemented early (Chee, 2013; Petersson et al., 2009). By understand the needs of this group of users and the types of struggles they face in the home, we hope to be able to inform designers and engineers who may be able to craft solutions.

2. Method

One of the challenges of conducting ethnographic research is to disseminate the results in such a way that maximizes the utility of the research while protecting the privacy and the rights of the research participants. In a previous study, Georgia Tech HomeLab researchers recruited and conducted extensive research studies in the homes of participants that became disabled prior to age 50 that were now potentially aging into secondary, age-related disabilities such as hearing loss or arthritis, thus leading to increased functional limitations. Our hypothesis was that individuals who have become accustomed to specific assistive technology to increase their level of function as a workaround for their primary disability may face unique challenges because of interruptions to their adaptive strategy as a result of age-related secondary disabilities.

In order to evaluate this hypothesis, we recruited 24 participants and scheduled times to conduct research in the homes of the research participants. We developed the research protocol to elicit data through direct observations of behavior, modifications to the home, and task demonstrations as well as structured interviews concerning mobility-related activities of daily living. The researchers made numerous observations and photographs documenting challenges faced by the research participants. The core of the data collection became the basis for an

ongoing study of how individuals with primary disabilities age in place.

Given the nature of the research it is difficult to share the details of the research openly. The privacy of the research participant must be honored. We often discussed highly sensitive topics such as bathroom transitions and sleeping behaviors with participants and it would not be appropriate to share those intimate details with the general research community. However, in order to have an impact and address some of the unmet needs, we identified that we want to share our research with a broad community. Therefore, we have created a set of personas that are suitable for classroom or instructional usage. A persona is a fictitious description of a person, situation, and/or environment that are based on real world observations. The persona is a useful empathy building tool that communicates the context of the situation while not divulging private information.

The Georgia Tech HomeLab team identified a series of instructional personas based on the in-home data collection that we felt would be both instructive and provide sufficient background to communicate interesting design challenges that a student or student-led team might want to investigate. We started by first creating the scenario based on a real observation. From there, we selected photographs and other data that would be useful for providing context to the scenario. The data from each persona were combined from multiple sources in order to preserve the privacy of the individual participants. As such, each persona does not represent a specific observation but rather a common theme that was observed across multiple research participants. When necessary, we supplemented the actual data with creative narratives to further provide the necessary context to support a design exercise.

3. Evaluation

The raw data for the personas were assembled and a graphic designer was asked to package the data into a handout that could be provided in a classroom setting. Once assembled, we distributed the personas to a Georgia Tech Industrial Design studio class where students could select individuals design challenges based on the personas. The personas were used as inspiration for new potential solutions to address the need in the context described in the narratives and illustrations. Feedback from the usage of the personas in the classroom setting was obtained from the class instructor. In some cases, the student design teams desired additional context about the specific functional limitations of the fictitious person described in the persona. Other lessons learned were the desire to provide higher resolution imagery so that photographic details could be easily analyzed. We revised the personas per the feedback from the class and produced a 2nd generation of the personas.

4. Discussion

The personas represent a valuable resource for communicating some of the key findings of the Georgia Tech HomeLab in-home research. The personas represent common observations and present interesting design challenges to engineering and industrial design students as well as manufacturers interested in producing new assistive technology or universal design solutions intended to enhance the quality of life of someone with a primary disability aging into a secondary disability.

5. References

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6. Appendix



What?

10 personas created to stimulate design thinking for people with mobility impairment.

Who?

These personas were created from study data in which participants with mobility impairment were observed completing everyday activities in their homes. Relevant assistive technology and routines were documented.

How?

Explore solutions that produce a better quality of life for the person, keeping in mind potential financial and other constraints. Use critical thinking to avoid "band-aid" or "obvious" design.

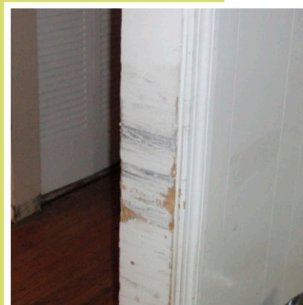
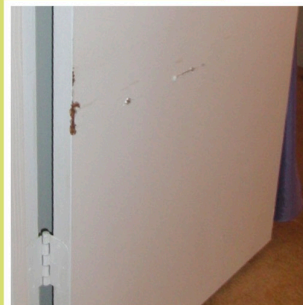
Background

Joan has multiple sclerosis and has low upper and lower body mobility. She lives in her residential home with her husband as a caregiver, and uses a power chair.

They have not been able to remodel their home due to finances, and as a result some passages are too narrow for Joan's power chair (26"W). The chair knocks into her door frames (34"W) on a regular basis, causing damage.

Design Challenge

Create a creative and cost-effective solution to prevent more damage to Joan's door frames.



JOAN

Background

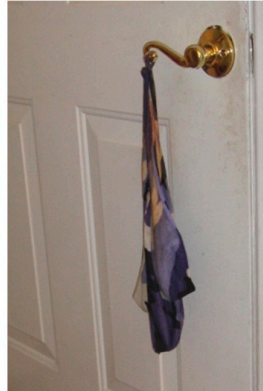
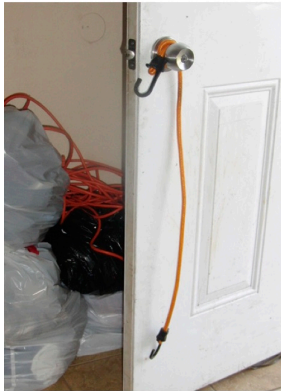
Chris has chronic emphysema, and is able to drive independently but still requires a scooter to move around. He and his wife spend a significant amount of time and effort dismantling and loading the scooter into their van. Even though he has strong upper and lower body strength, he does not have the lung endurance to stand up for long periods of time. Chris needs to sit on a milk crate while he assembles and takes apart his scooter.

"I shouldn't have to do that"

**Design Challenge**

How can design help Chris and his wife assemble and disassemble his scooter quickly?

CHRIS

**Background**

Janice and her service dog live independently in her family home. Due to Janice's arthritis and low range of motion, she has placed cords and handkerchiefs on all of her doorknobs to assist both her and her dog in closing doors. The cords work well but are still hard to grasp.

Design Challenge

Is there a better way for Janice and her dog to move throughout her home?

LILLIAN



Background

Lillian uses a wheelchair and is still very active in her kitchen. She has slightly modified the panel under her kitchen sink so she her wheelchair could fit more comfortably, but could only do so much due to plumbing constraints. As a result, Lillian isn't able to reach all the way into her sink to clean her dishes.

"Things take longer"

Design Challenge

Create an efficient and affordable dishwashing experience that accommodates any plumbing but allows Lillian to comfortably clean her dishes.



Background

Jim lives alone in an assisted living facility and uses a manual wheelchair to get around his apartment. As he ages, he has gradually had to spend less time cooking and mostly prepares microwaveable food. He has had to purchase a second microwave to place on the counter, as the built-in microwave is too high for him to reach.

Design Challenge

How can Jim create a space efficient kitchen that allows him to cook the food he wants.



JIM

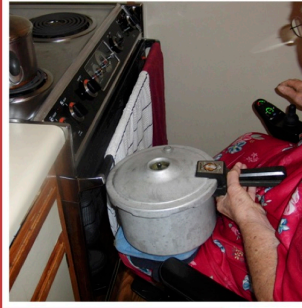
PATRICIA

Background

Patricia uses a power wheel-chair to move around her home. She spends a lot of her time in her kitchen cooking home cooked meals. Her meals require her to move back and forth with hot pots and pans, and to do this, she places a hot pad on her knee to transfer items. She holds the pot with one hand and steers her chair with the other. This method of transfer can be very unsafe and dangerous if Patricia makes a mistep.

Design Challenge

Design a solution that allows Patricia to safely transfer hot pots and pans into the sink from her power chair.

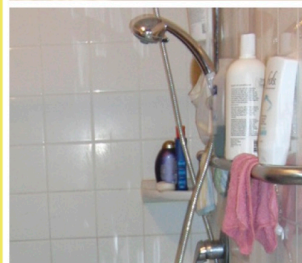
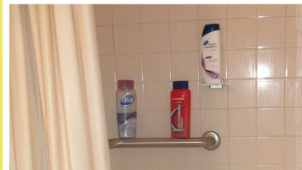


Background

Maureen is 80 years old and has had grab bars installed in her bathroom. She used her grab bars briefly, but has over time begun to use them as shelving for her shower supplies. Due to aging, Maureen is ver the last six months, Maureen has fallen 3 times when getting in and out of her shower.

Design Challenge

How can Maureen be encouraged to use her grab bars for their intended purpose.



MAUREEN

Background

Arnold loves to spend his time outside out in his yard and garden. Two months ago, he underwent hip replacement surgery and has been using a manual wheelchair while he recuperates. Arnold was able to raise his garden bed but even with strong upper body strength, he is unable to reach across the entire bed in his wheelchair. He is also unable to reach far enough to trim the leaves off of the bushes in his yard.

Challenge

Create a way for Arnold to be able to extend his reach and participate in the yard activity he likes.



ARNOLD

Background

Ben likes to leave the door to his front porch open from time to time to let the breeze in, but his screen door automatically shuts when it is let go. He uses a power chair and cannot bend down to place a doorstop on the ground, so he keeps a chair close by to prop the door open.

Challenge

Design an efficient solution that lets Ben enjoy the outdoor breeze.



BEN

Background

Wendy lives alone and is unable to transfer herself from her wheelchair onto the toilet seat independently. Instead, she brings her chair close to the toilet, unbuckles her seat belt, pulls down her pants, and leans over to relieve herself in a disposable plastic container. She then disposes the waste into the toilet and throws the container away. The plastic containers are purchased in bulk.

Challenge

Explore a more efficient and cost-effective method of disposing waste into the toilet.



WENDY